

# PATENT SPECIFICATION



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## PROVISIONAL SPECIFICATION

### Improvements in and relating to Self-Locking Nuts

I, FRANK BIRCHALL, a British subject, of St. Franklyn, Hoads Hill, Wickham, Hampshire, do hereby declare the nature of this invention to be as follows:—

- 5 The invention relates to the manufacture of self-locking nuts of the kind consisting of an axially extending wall and cylindrically shaped recess into which is secured an annular disc or short cylindrical inset having an inside diameter less than the larger diameter of the screw thread of the nut and being made of an elastic material such as vulcanised fibre. Unintentional relative movement between the nut and bolt due to either vibration or shock is effectively prevented by the penetration of the externally screw-threaded member into the elastic inset.

- 10 It has previously been proposed to secure the elastic inset in a nut of the kind described, by providing the cylindrically shaped recess with inwardly extending

projections against which the inset is forced, thereby preventing rotary movement of the inset. The inset is also 25 secured by turning inwardly a border portion of the axially extending wall of the nut.

The present invention has for its object to provide a nut of this type which is less 30 costly to produce, and has a reduced overall length while effecting the same security against unintentional relative movement due to vibration or shock.

In my improved lock-nut an annular 35 inset of elastic material such as either natural or synthetic rubber is moulded directly into the axially extending cylindrical recess, the inner surface of which has previously received a deposit of brass 40 and by which medium the inset is cheaply and effectively secured to the nut.

Dated the 26th day of August, 1943.

F. BIRCHALL.

## COMPLETE SPECIFICATION

### Improvements in and relating to Self-Locking Nuts

- I, FRANK BIRCHALL, a British subject, of St. Franklyn, Hoads Hill, Wickham, Hampshire, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

- 45 50 This invention relates to self-locking nuts of the kind provided with an annular recess in its bore in which recess an annular elastic inset is held. In known nuts of this kind, the inset has a cylindrical surface of less diameter than the root or larger diameter of the screw-thread on the nut so that the screw-thread on the bolt with which the nut is used penetrates the inset which effectively prevents 55 accidental rotation of the nut relatively to the bolt due to vibration or shock.

- 60 It has been proposed to preform the inset, usually from vulcanised fibre, in the form of a short cylinder having an axial bore or of a number of washers and to insert it axially into the annular recess which initially is open at one end, and to

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retain the inset in the recess by turning a cylindrical wall at the open end of the recess inwardly against one radial face of 70 the inset. In these prior constructions, rotation of the inset in the recess is prevented by forming the cylindrical wall of the recess with one or more inwardly-extending projections 75 which penetrate the inset or fit into depressions therein, or by forming the inwardly turned portion of the nut, or the inner radial wall of the recess, with projections that penetrate the inset. 80

The present invention has for its object to provide a nut of the above kind which is less costly to produce and has a shorter overall length than known nuts of this kind but is equally as efficient. 85

The present invention provides a nut which is formed in its bore with an annular recess which is filled by an inset or ring of a resilient rubber-like material moulded into the recess and having its 90 internal surface extending inwardly beyond a surface formed by continuing

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the thread of the nut into the recess. Preferably the ring is bonded to the material of the nut so that it will not rotate therein in use.

5 According to a feature of this invention, an incompletely formed screw-thread of the same pitch as, and continuing that of the nut is moulded in the inner surface of the ring. In a preferred arrangement the thread on the moulded ring is thicker than the thread of the nut but is truncated so that its cross-sectional area is approximately the same as that of the thread of the nut.

15 A nut in accordance with this invention will now be described by way of example only with reference to the accompanying drawings in which:—

Figure 1 shows the nut in section through its axis, and

20 Figure 2 shows a portion of Figure 1 to a greatly enlarged scale.

The nut 10 is made of any suitable metal of hexagonal or other section and with a screw-threaded bore 11. The nut is formed with a tubular extension 12 on its top face and this extension has a greater internal diameter than the bore 11 to provide an annular recess 13 which is open to the top of the extension 12. The depth A (Figure 2) of the recess 13 below the root diameter of the nut thread is in the order of two-thirds of the depth B of the thread and the width C of the recess is in the order of twice the pitch of the thread. An inset or ring 14 of natural or artificial rubber or of a resilient plastic (such as those known as "elastomers") having similar properties to rubber is moulded into the recess 13. Synthetic rubber is the preferred material. The ring is bonded under heat and/or pressure to the walls of the recess so that it will not rotate in the recess and, where the nut is made of a metal to which the material of the ring will not readily bond, the walls of the recess may be coated with another metal to which the ring can be bonded. Thus, in the case of a steel nut, the walls of the recess 13 are preferably coated with a layer 15 of brass deposited electrolytically or by spraying and the ring is formed of synthetic rubber which will bond to brass but not to steel.

55 The walls of the recess may also be coated with a material that will assist in bonding the ring to the walls of the recess.

The ring 14 is moulded in its internal surface with an incompletely formed screw-thread 16 of the same pitch as the nut-thread and continuing it. The profile of the nut-thread is super-imposed in Figure 2, by a chain dotted line 18, on the thread in the ring and it will be seen that the thread 16 is incompletely formed

in that it is oversize or thicker than the nut-thread and is truncated at 17, its crest being removed. The shape of the thread 16 is such that its cross-sectional area is approximately the same as that of the nut-thread. It will be seen that the internal surface of the ring extends inwardly beyond the surface, indicated by the line 18, formed by continuing the nut-thread into the recess.

When the nut is screwed on to a bolt or other externally-threaded part, the thread 16 will be compressed laterally and will expand towards its crest and will assume, more or less, the configuration shown by the chain-dotted lines. The thread 16 will thus bind on the male thread on to which it is screwed so as to resist rotation of the nut relatively to the bolt or other part. The nut is thus self-locking and will not unscrew when subjected to vibration or shock. It can however be unscrewed by means of a key or spanner and may then be used again although it may not lock itself so efficiently as a new one, when re-used.

It will be seen that the inset or ring in the present nut is retained in position and held against rotation by bonding it to the nut so that the cost of forming projections in the recess and of turning a portion of the nut inwardly to retain the inset or ring is avoided while the omission of the inturned portion also reduces the overall length of the nut.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A nut formed in its bore, with an annular recess which is filled by a ring of a resilient rubber-like material moulded into the recess and having its internal surface extending inwardly beyond a surface formed by continuing the thread of the nut into the recess.

2. A ring according to Claim 1, wherein the ring is bonded to the walls of the recess in the nut.

3. A nut according to Claim 1 or Claim 2, wherein an incompletely formed screw-thread of the same pitch as, and continuing, the thread of the nut is moulded in the internal surface of the ring.

4. A nut according to Claim 3, wherein the thread on the moulded ring is thicker than the thread of the nut but is truncated so that its cross-sectional area is approximately the same as that of the nut.

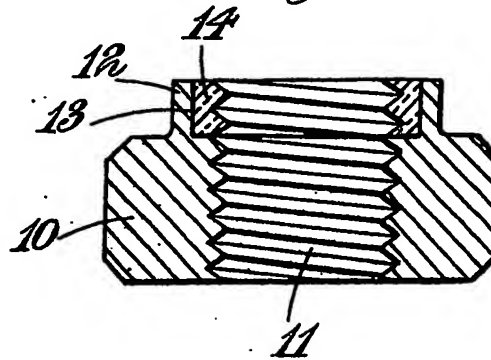
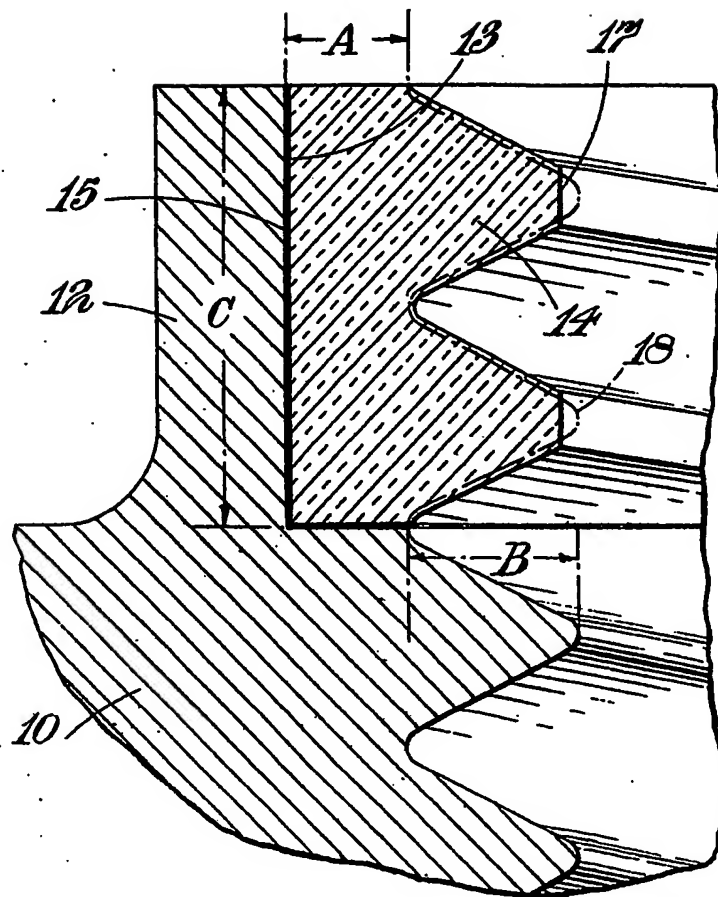
5. A nut according to any of the preceding claims, wherein the moulded ring is formed of natural or artificial rubber.

6. A nut as described herein and illustrated in the accompanying drawings.

Dated this 31st day of August, 1944.

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*Fig. 1.**Fig. 2.*

[This Drawing is a reproduction of the Original on a reduced scale.]

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